



INTERNATIONAL PRELIMINARY EXAMINATION REPORT
(PCT Article 36 and Rule 70)

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Applicant's or agent's file reference DE920020033		FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/PEA/416)	
International application No. PCT/EP 03/12167		International filing date (day/month/year) 31.10.2003	Priority date (day/month/year) 19.12.2002
International Patent Classification (IPC) or both national classification and IPC G05B19/042			
Applicant INTERNATIONAL BUSINESS MACHINES CORPORATION et al.			
<p>1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of 5 sheets, including this cover sheet.</p> <p><input checked="" type="checkbox"/> This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).</p> <p>These annexes consist of a total of 2 sheets.</p>			
<p>3. This report contains indications relating to the following items:</p> <p>I <input checked="" type="checkbox"/> Basis of the opinion</p> <p>II <input type="checkbox"/> Priority</p> <p>III <input type="checkbox"/> Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</p> <p>IV <input type="checkbox"/> Lack of unity of invention</p> <p>V <input checked="" type="checkbox"/> Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</p> <p>VI <input type="checkbox"/> Certain documents cited</p> <p>VII <input type="checkbox"/> Certain defects in the international application</p> <p>VIII <input type="checkbox"/> Certain observations on the international application</p>			
Date of submission of the demand 14.07.2004		Date of completion of this report 08.04.2005	
Name and mailing address of the international preliminary examining authority:  European Patent Office - P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk - Pays Bas Tel. +31 70 340 - 2040 Tx: 31 651 epo nl Fax: +31 70 340 - 3016		Authorized Officer Meseguer Mayoral, J. Telephone No. +31 70 340-3312 	

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International application No. PCT/EP 03/12167

I. Basis of the report

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):

Description, Pages

1-13 as originally filed

Claims, Numbers

1-7 received on 18.03.2005 with letter of 17.03.2005

Drawings, Sheets

1/3-3/3 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
 - ☐ the language of publication of the international application (under Rule 48.3(b)).
 - ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).
3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:
- ☐ contained in the international application in written form.
 - ☐ filed together with the international application in computer readable form.
 - ☐ furnished subsequently to this Authority in written form.
 - ☐ furnished subsequently to this Authority in computer readable form.
 - ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
 - ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
- ☐ the claims, Nos.:
- ☐ the drawings, sheets:

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5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)).
(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	1-7
	No: Claims	
Inventive step (IS)	Yes: Claims	1-7
	No: Claims	
Industrial applicability (IA)	Yes: Claims	1-7
	No: Claims	

2. Citations and explanations

see separate sheet

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Re Item V

Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Reference is made to the following documents:

D1: EP-A2-1 136 325 (DENSO CORPORATION)

2. The document D1 is regarded as being the closest prior art to the subject-matter of **claim 1**, and shows an electronic circuit in an embedded processing system covering a plurality of technical functions, the operative functions of which are performed with a respective plurality of application-specific Electronic Control Units (*see D1, figure 1*).

2.1 The subject-matter of claim 1 differs from the circuit known from D1 in that the controller means with the application specific support functions and I/O subsystems, and the processor units that supply computing power to each controller means are implemented on different chips.

The subject-matter of claim 1 is therefore new (Article 33(2) PCT).

2.2 The problem to be solved by the present invention may be regarded as how to decrease the cost of fabrication of the electronic control units (ECUs).

The solution to this problem proposed in claim 1 of the present application is considered as involving an inventive step (Article 33(3) PCT) for the following reasons:

a. The technical effect of the combination of features a-c of claim 1 is such that the processing power (which can be implemented in a low cost fashion) can be separated from application-specific logic (which can be produced only with higher cost), thus allowing the use of standard components that would cause the fabrication of ECUs to be more cost effective.

b. There is no hint to the skilled person in the prior art to separate the computing power and the application-specific elements in an ECU.

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c. It is also not obvious to the skilled person, using the general knowledge, to arrive to the solution of claim 1, as the regular practice in the prior art points already in a different direction: designing an ECU with computing power and application-specific functions and I/O subsystems in the same chip.

The subject-matter of claim 1 can be considered as inventive (Article 33(2) PCT).

2.3 **Claims 2-7** are dependent on claim 1 and as such also meet the requirements of the PCT with respect to novelty and inventive step.

2.4 The electronic circuit claimed may be used in the control of vehicles; an industrial application is therefore given.

C L A I M S

1. An electronic circuit in an embedded processing system covering a plurality of technical applications, the operative functions of which are performed with a respective plurality of application-specific Electronic Control Units (ECU), characterized by having
 - a) a plurality of extracted interface expander-controllers (30A,...30E) comprising each a respective one of said application-specific I/O subsystems, and
 - b) one or more standard processor units (40) having a standard I/O-interface connecting to a respective extracted interface chip (30A,...30E).
2. The circuit according to claim 1, further having mapping means (70, 26) and a General Controller Unit (12) operatively coupled thereto for dynamically switching a processor (40) to a selected extracted interface chip (30A,...30E) under consideration of processor timing requirements.
3. The circuit according to the preceding claim having a primary layer (50) comprising basic configuration layout data (54) and a standard interface means (52) for connecting to said plurality of standard processors (40), and a secondary layer (60) comprising an "autonomic-state" switchboard matrix means (62), an emergency switchboard matrix means (64) and a port interface means (66) connecting to said plurality of application-specific I/O subsystems.
4. The circuit according to the preceding claim, further having an additional controller implementing a

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monitoring function (90,100) <Watchdog> for the operational status of said plurality of standard processing units (40) and extracted interface chips (30A,...30E), and being operatively coupled to said General Controller Unit (12).

5. The circuit according to claim 1, further comprising a database storing instructions how to handle specific breakdown cases of error state cases associated with either of said standard processors.
6. The circuit according to claim 1, further comprising a emergency controller (110, 112) for continuously storing current global positioning system (GPS) coordinates and dedicated to send an emergency signal including said coordinates, in case one or more external sensor devices detect an emergency case.
7. An embedded system having an electronic circuit according to one of the preceding claims 1 to 6.

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